Current Situation and Prospect for Oil Project in Northeast Asia

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Presented by : HWANG, Sang-Chul
Managing Director, KNOC

Korea National Oil Corporation

Contents

PART 1.

The Recent Change of Int'l Oil Market and NEA

Rapidly Changing World Oil Map

□ 3 common Features of the rapidly changing Oil Market

- The continuous high oil price brings the oil market change

High Oil Price

- rising price up to 323% for the last 5 years
- Dubai : $23.9/bbl('02) → $77.2/bbl(10.'07)

Resources Nationalism

- Russia and South American countries (Bolivia, Venezuela etc) introduce strong resources nationalism for political and/or economic reasons

Non-conventional Oil Resources

- Non-conventional oil resources is newly exploited due to high oil price

Increasing Energy Risk in NEA

☐ **Asymmetric Market Structure, Dependence on Import, Uncertainty on Energy Cooperation**

→ **Energy risk in NEA is increasing**

Asymmetric Market Structure

- **The only oil supplier (Russia) with 3 big consumers (China, Japan, Korea)**

High dependence on Import

- **Crude oil import volume from ME has sharply grown**
- **Crude oil import in Asia-Pacific increases 25% for last 5 years : 2,877MM bbl ('01) → 3,509MM bbl ('06)**

☞ China 240% Increase : 447MM bbl ('01) → 1,074MM bbl ('06)

Uncertainty on Energy Cooperation

- **Tangled politics among NEA countries**
- **Asian premium issue, East-Siberian pipeline issue**

PART 2.

NEA Oil Demand and Import

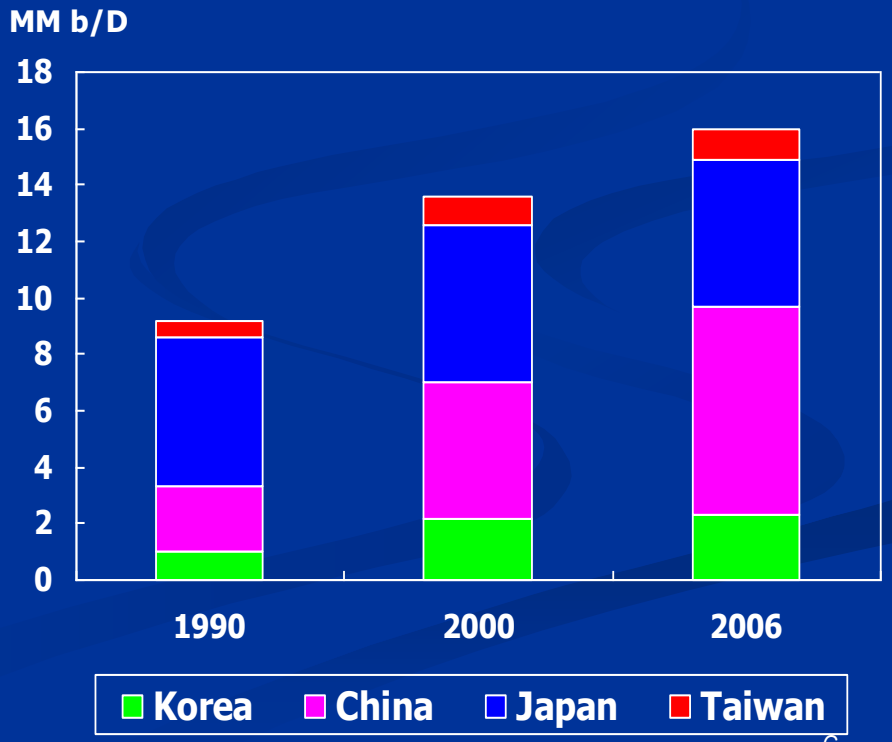
NEA Oil Demand - Current Situation

□ Rapid increase of crude oil demand

- Crude oil demand of China, Japan, Korea and Taiwan
  * Accounts for 19% of the world oil demand
- Average growth rate since 2000 : 2.8% (World average : 1.5%)
  * China 7.7%, Korea 0.6%, U.S 0.7%, Europe 0.7%

	'90	'00	'06
Korea	1.0	2.2	2.3
China	2.3	4.8	7.4
Japan	5.3	5.6	5.2
Taiwan	0.6	1.0	1.1
Total	9.2	13.6	16.0
(Ratio, %)	13.8	17.8	19.2
India	1.2	2.3	2.6
World	66.4	76.3	83.7

* BP, Statistical Review of World Energy 2007



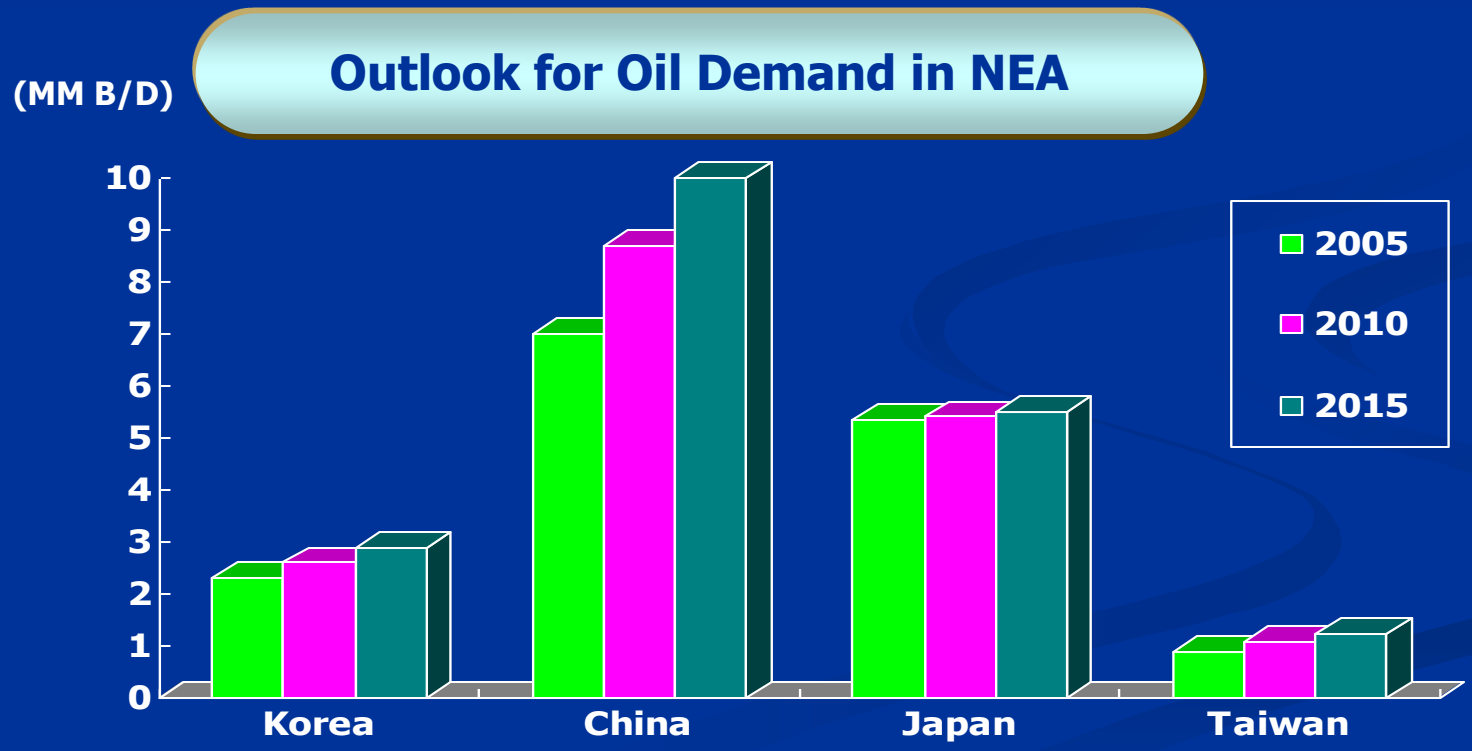
NEA Oil Demand Forecast

□ Oil Demand Forecast

- 14.8MMb/d('05) → 19.3MMb/d('15) : 4.5 MMb/d

  * China's contribution(4.2MMb/d increase) : 93%

- Marking as world consumption center → Increase of trade volume to be followed



* EIA, International Energy Outlook, June 2007, Taiwan : FACTS, Asia-Pacific Databook (Spring 2007)
  BP, Statistical Review of World Energy 2007

Increase of Oil Import Dependence

□ Oil Dependence rate in Asia Pacific is expected to be increased

- Demand increase 6.2 MMb/d > oil production increase 0.8 MMb/d
- Offshore dependence : 74%(`05) → 76%(`15)

Asia & Pacific Oil Demand, Production, Imports & Dependence

(Unit : MMb/d)

	`05	`10	`15
Demand (A)	21.3	24.7	27.5
Production - Consumption (B)	7.5 5.6	8.3 6.4	8.3 6.4
Net Imports (A-B) - ME Crude	15.8 11.6	18.3 13.3	21.0 15.8
Dependence (%)	74	74	76

* FACTS, Asia-Pacific Databook (Spring 2007)

PART 3.

NEA Oil Trade Outlook

NEA Oil Trade Outlook - 1

□ Emergence of New Crude Oil Supply Sources

- The Caspian Sea, the northeastern part of Russia, etc.

⇒ Expected to sharply increase Crude Oil import & transportation demand

Caspian Sea

- Enormous Oil Deposits(230B bbl est.)
- Connected with the Mediterranean, North Africa and Middle East by P/L

East Siberia Sakhalin Kamchatka

- East Siberia : under construction ('06.4 beginning)
- Sakhalin : 0.45MM b/d production('08)
- Kamchatka : under Exploration huge potential

- Various Crude oil flows into NEA

⇒ Logistics demand to be expanded

NEA Oil Trade Outlook - 2

□ Invigoration of Non-Conventional Oil Production

- Owing to High oil prices, production of Oil sand in Canada and Venezuelan heavy crude to be activated

⇒ Expected to increase transportation demand & oil inflow into NEA

Oil Sand

- Alberta, Canada
- Production Capacity : 1.1 MM b/d → 3 MM b/d ('15)

Orimulsion

- Orinoco, Venezuela
- Production Capacity : 0.6 MM b/d → 1.5 MM b/d ('15)

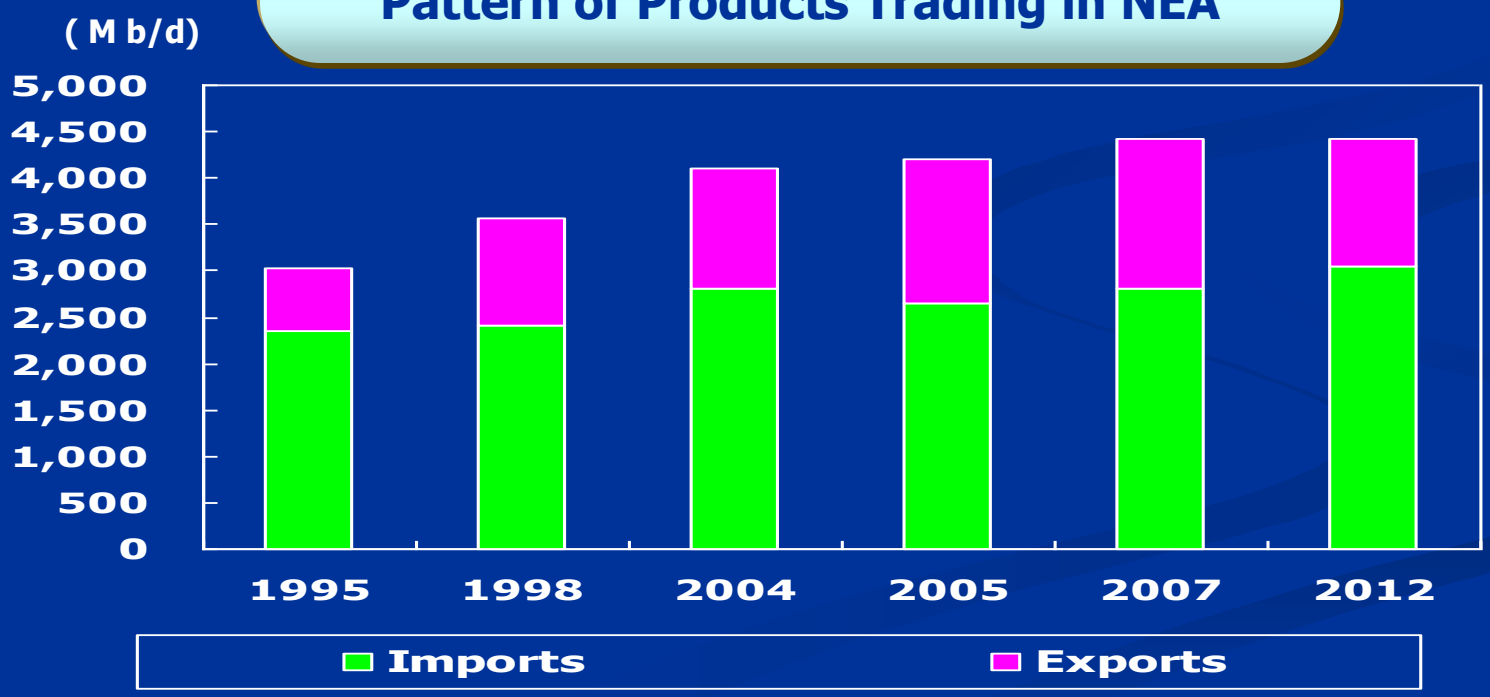
- Main target : NEA
- Leads to Logistics demand expansion

NEA Oil Trade Outlook - 3

□ **Due to increase of demand in the region and deepening of supply & demand disparity, petroleum products will be traded actively in the near future**

- Trading volume : 4,420 m bbl('06) → 5,080 m bbl('12)
- Imports: 2,837m bbl('06) → 3,029 m bbl('12)
- Exports: 1,583m bbl('06) → 2,051 m bbl('12)

Pattern of Products Trading in NEA



* FACTS, Asia-Pacific Databook (Spring 2007)

NEA Oil Trade Outlook - 4

□ Expected to increase Trading Volume due to disparity of consumption and refining capacity, various specifications in the region

Trade to utilize difference of Specification

Import low quality product at low price

Value-added process like Upgrading, Blending etc.

- Export to intra & offshore markets
- Vitalization of Products Trade
- Increase of storage facilities & transportation

NEA Oil Trade Outlook - 5

□ **Products trade expected to increase in accordance with reinforcement of environmental regulations**

- Due to enlargement of refining capacities restricted (i.e. the U.S.)

⇒ Supply disruption for light distillate and high-quality refined products

- Due to environmental regulations, trading-opportunity of countries with upgrading facility to be expanded.

⇒ Vitalization of Distillate trade and Increased demand for transportation

Expanding demand for high quality products due to environmental regulations

Restriction of enlarging refining facilities

Intensification of Quality standardization

Increased demand for High Quality Products from U.S. and Others

- Countries with surplus Upgrading Facility explore more opportunities to increase their trade volume

Plan to upgrade refining facilities in the region

☐ Accelerate to expand upgrading facilities in the region

- Due to increase of import from Middle East and expansion of spread between light and middle distillate

	'07 (MB/D, %)			'12 (MB/D, %)		
	C D U	Upgrading	Ratio	C D U	Upgrading	Ratio
Korea	2,579	654	25.4	2,579	824	32.0
China	7,512	3,418	45.5	10,084	5,583	55.4
Japan	4,454	1,806	40.5	4,542	2,030	44.7
Taiwan	1,293	465	36.0	1,293	588	45.5
Total	15,838	6,343	40.0	18,498	9,025	48.8

- Sulfur contents regulation of Gas Oil in the region (Unit : ppm)

	2000	2005	2007	2008	2009
China	2000	500	500	50	50
Hong Kong	500	50	50	50	10
Japan	500	50	50	10	10
Singapore	2000	50	50	50	10
Korea	500	430	30	30	10
Taiwan	500	350	50	50	10

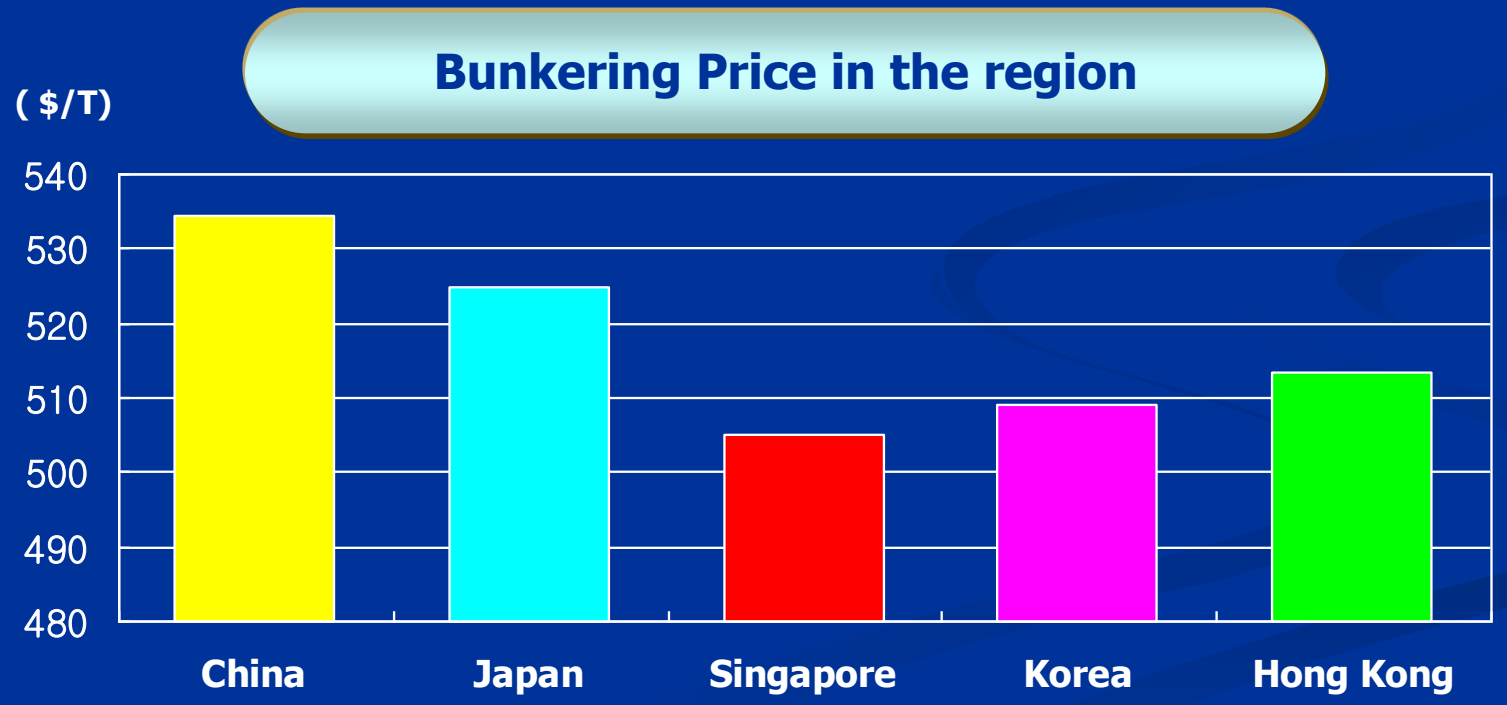
* China – Beijing, Shanghai, Gwangzhou / Korea and Japan produce 10ppm.
* FACTS, Asia-Pacific Databook (Spring 2007)

NEA Oil Trade Outlook - 6

□ Bunkering demand increase in NEA

- NEA seaborne trade volume has expanded due to rapid growth of economy

⇒ Singapore is international bunkering center, but Korea also has a potential as bunkering center in NEA



* Platts Oilgram Bunkering (07.11.1)

Plan to Energy Cooperation in NEA

- Caspian Sea
- Russian Sakhalin
- East Siberia
- Africa, Middle East

Crude Oil

- Canada : Oil sand
- Venezuelan : Orimulsion

Non-Conventional OIL

- Gradual Expansion of Intra & Offshore Trade
- Export Capacity of Countries with Surplus Refining capacities

Products

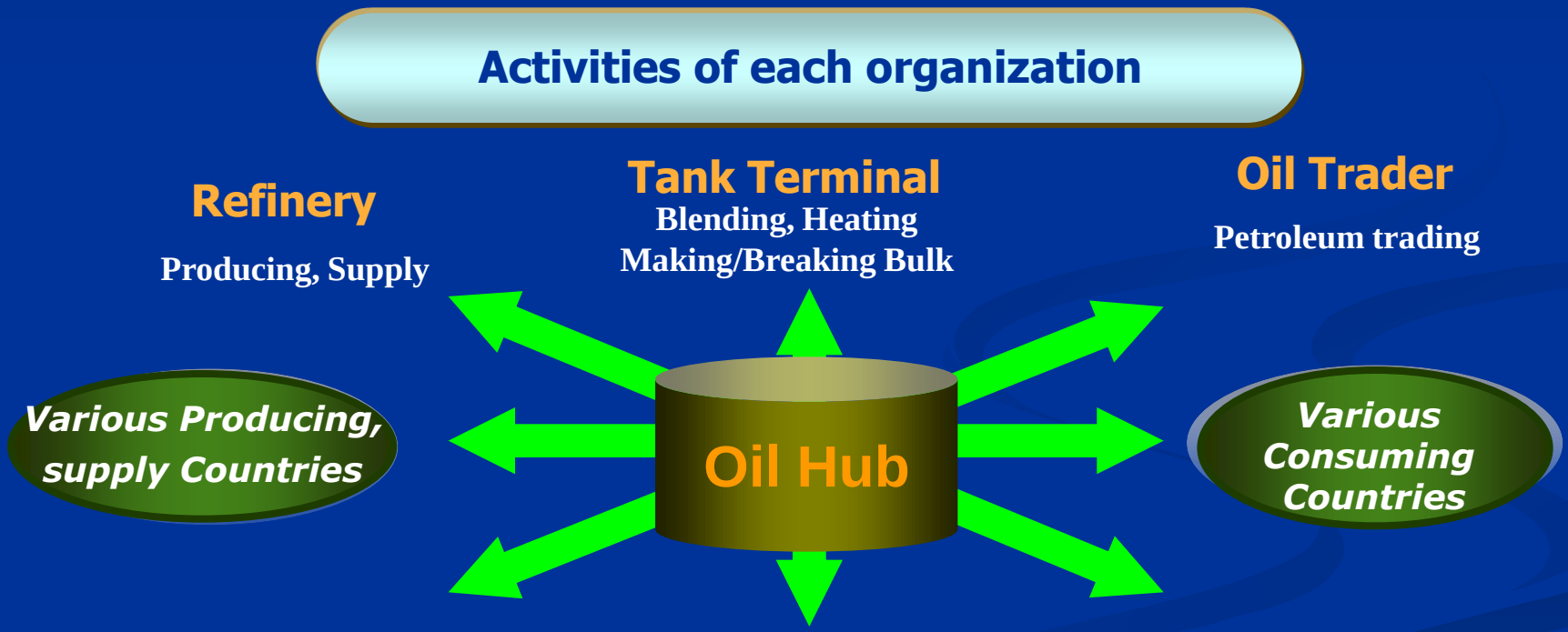
NEA Oil Hub

PART 4.

Necessity for Implementing NEA Oil Hub

Overview of Oil Hub

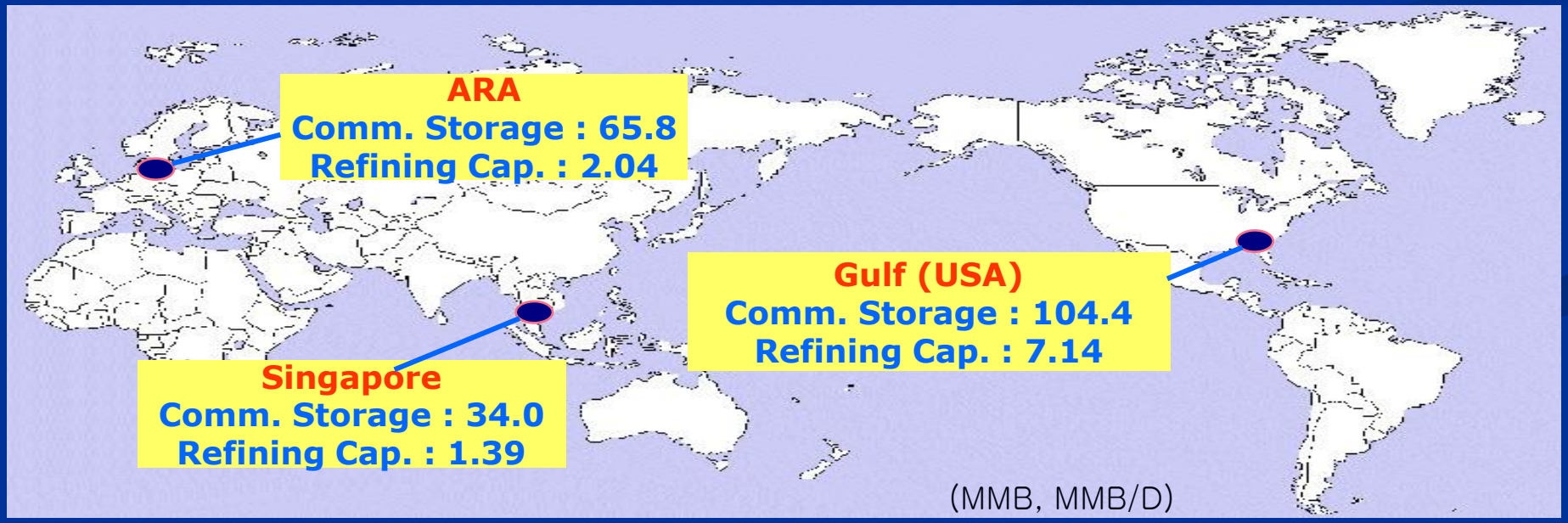
- The collecting and distributing center for petroleum located in main route
- The hub for logistics activities (i.e. producing/ supplying/ discharging/ storing/ treatment for value added, trading) by refinery, trader, tankage companies



Major Oil hubs in the world

☐ Storage Facilities and Refining Capacity of Oil Hubs

Oil Hub	A) Commercial Storage (mm bbl)	B) Refining Capacity (mm bbl/D)	A/B	Target Market	Features
Gulf (USA)	104.4	7.14	14.6	USA	Domestic market
ARA	65.8	2.04	32.3	West Europe	Export to neighbor countries
Singapore	34.0	1.39	24.5	SEA, China etc	Intermediate trading



Netherlands Rotterdam(Vopak Europort)

Singapore (Jurong)

- Total 3,200 ha of reclaimed land
- 4 refining facilities (ExxonMobil 2, Shell, SRC : Total 1.4mm b/d)
- Petrochemical facilities: Ethylene 1.8mmTon/Y, Propylene 1mmTon
- Storage facilities: 80mm bbl of Oil & Chemicals Storage (Singapore)
  - Storage facilities owned by refinery : 58% (46mm bbl)
  - Independent (Vopak, Tankstore, Oiltanking) : 42% (34mm bbl)

Advantages of Korea and Possibility of two Hubs in Asia

- Geographical Advantages/ Competitiveness of Transportation Fee
- Surplus Refining Capacity(600m B/D)
- Emerging NEA Oil Market
- Increase of Product Trade Volume (to USA etc)

→ **Increase of possibility to implement New Oil Hub**

Asian Market is divided into two sections, SEA Market and NEA Market, by Xiamen, China
*45% of Trading based on Singapore is for NEA Market (mostly for Canton, South China)

Asian Oil Market's dividing into two Sections

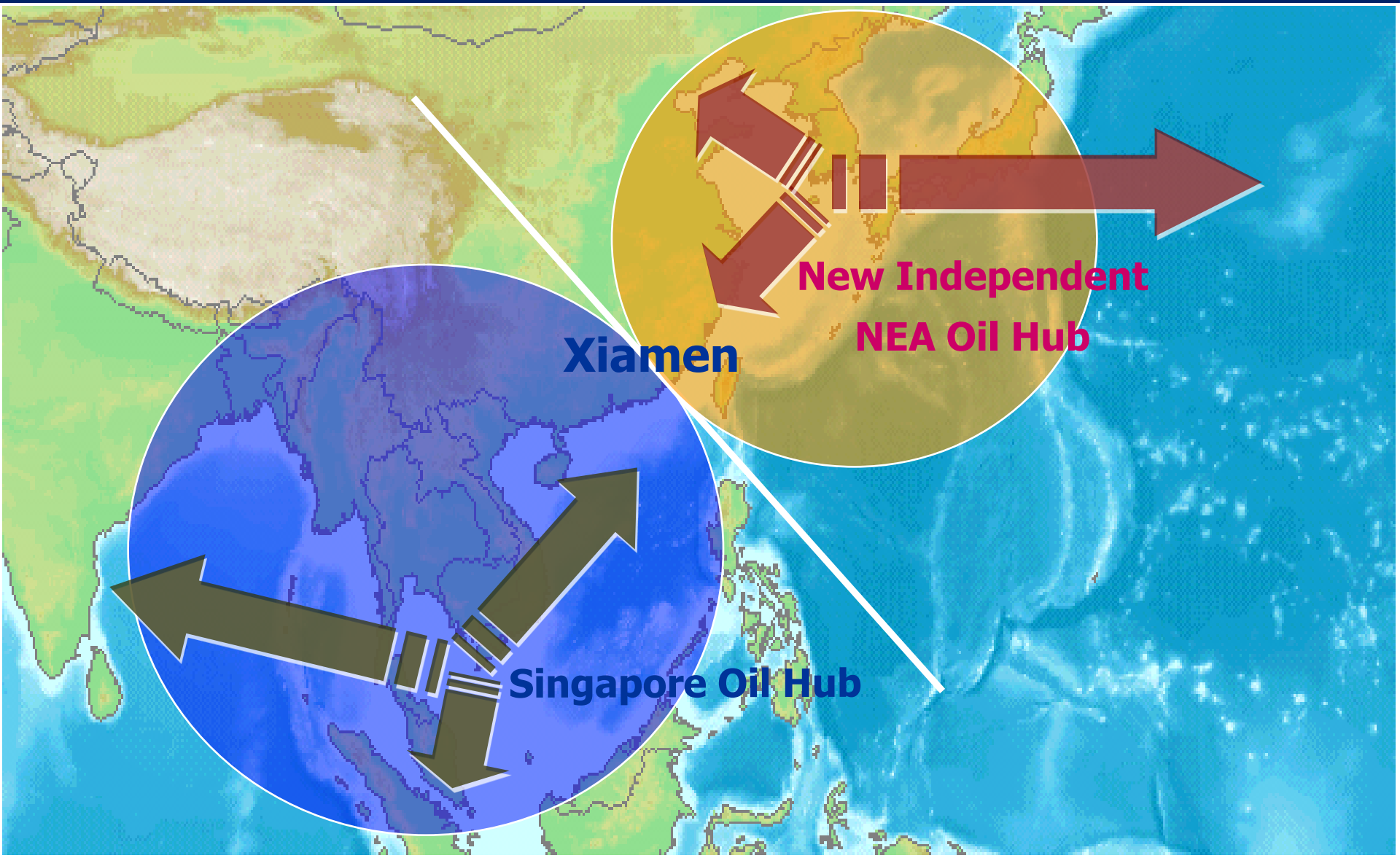
Singapore Market

Focusing on India,
South-East Asia
and West-South Asia

New Market in NEA

Independent Market for
the Pacific Rim inclusive of
China, Japan, USA and Canada

Two Oil Hubs in Asia



Demand for Storage Facilities by Oil Trade Increase

- Storing and Making Bulk of Sakhalin Crude Oil
- Storing and Making Bulk of NEA Petroleum Products for Export to USA
- Value added Service of Adjusting Quality (Blending etc) for various Products Quality Regulations
- Import Big Cargo and Redelivery with Breaking Bulk for Crude Oil

PART 5.

Action Plan for NEA Oil Hub

Crude Oil

Unit : MB

	Current	Future
Crude	27,500	35,800
Product	2,100	4,200
Total	29,600	40,000

	Current	Future
Product	-	900
Sub Total	-	900

Pyeongtaek

Seosan

	Current	Future
Crude	5,400	7,200
Product	2,100	3,300
Sub	7,500	10,500

	Current	Future
Crude	2,000	4,000
Sub	-	4,000

Ulsan

	Current	Future
Crude	13,300	17,800
Sub	-	17,800

Yosu

Keoje

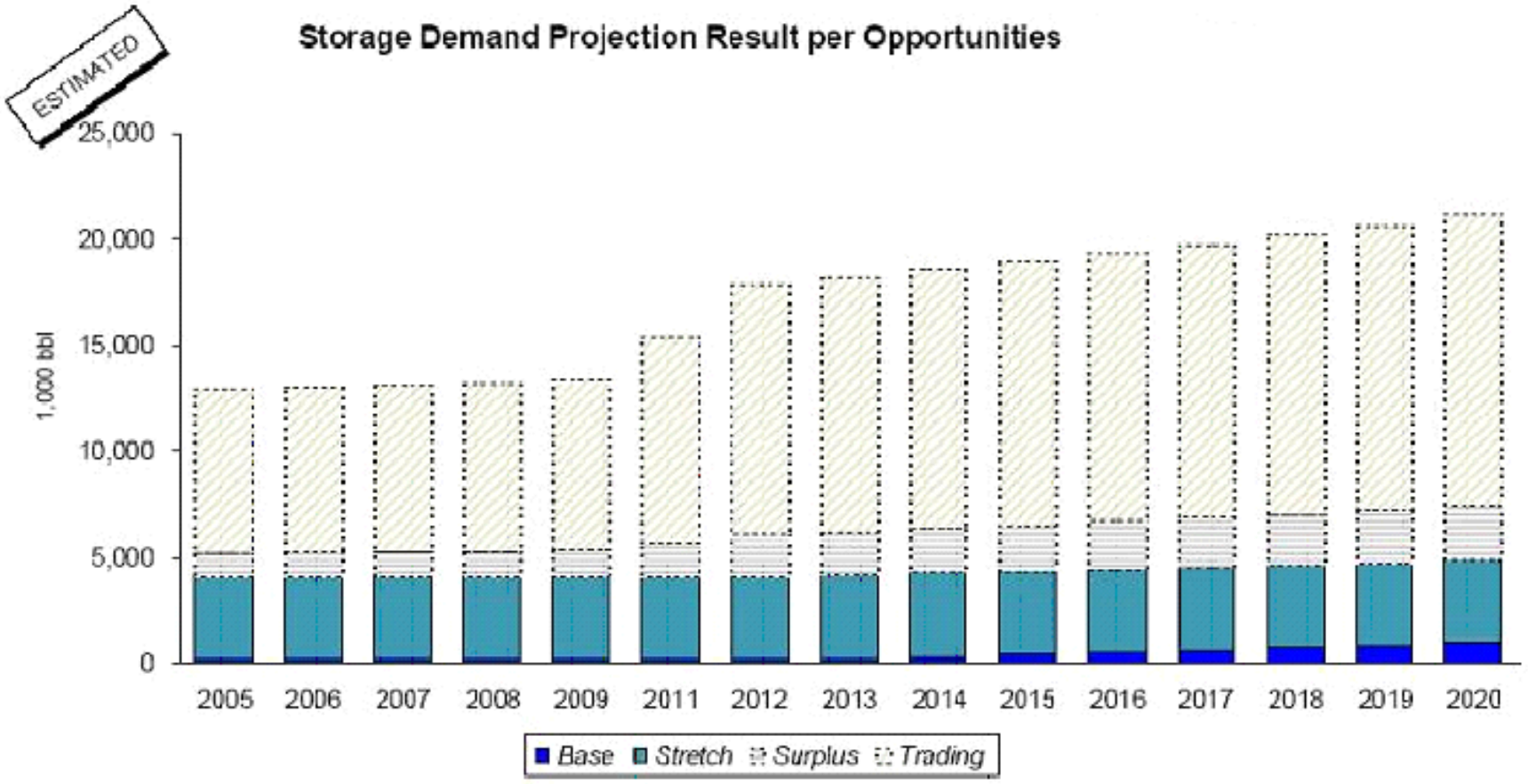
	Current	Future
Crude	6,800	6,800
Sub	-	6,800

Products

Main body	Joint Venture : KNOC, Trader, Tankage company, Local refiners etc.
Location	Yosu (KNOC, Yulchon, etc) Ulsan (KNOC, Odfjell, Vopak, Near SK) Busan (Busan New Port-BPA)
Capacity	4.6 ~ 28MMB
Financing	Mainly Poject Finacing * In case of Yosu & Ulsan, KNOC contributes land in and around Yosu & Ulsan terminal

Products

☐ Storage demand forecast in NEA



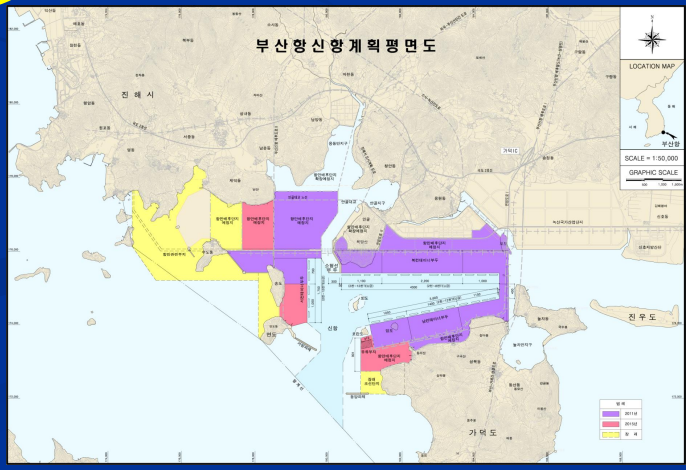
*** Source : Booz Allen Hamilton Analysis**

Proposed Sites for Oil Hub

Ulsan

Busan

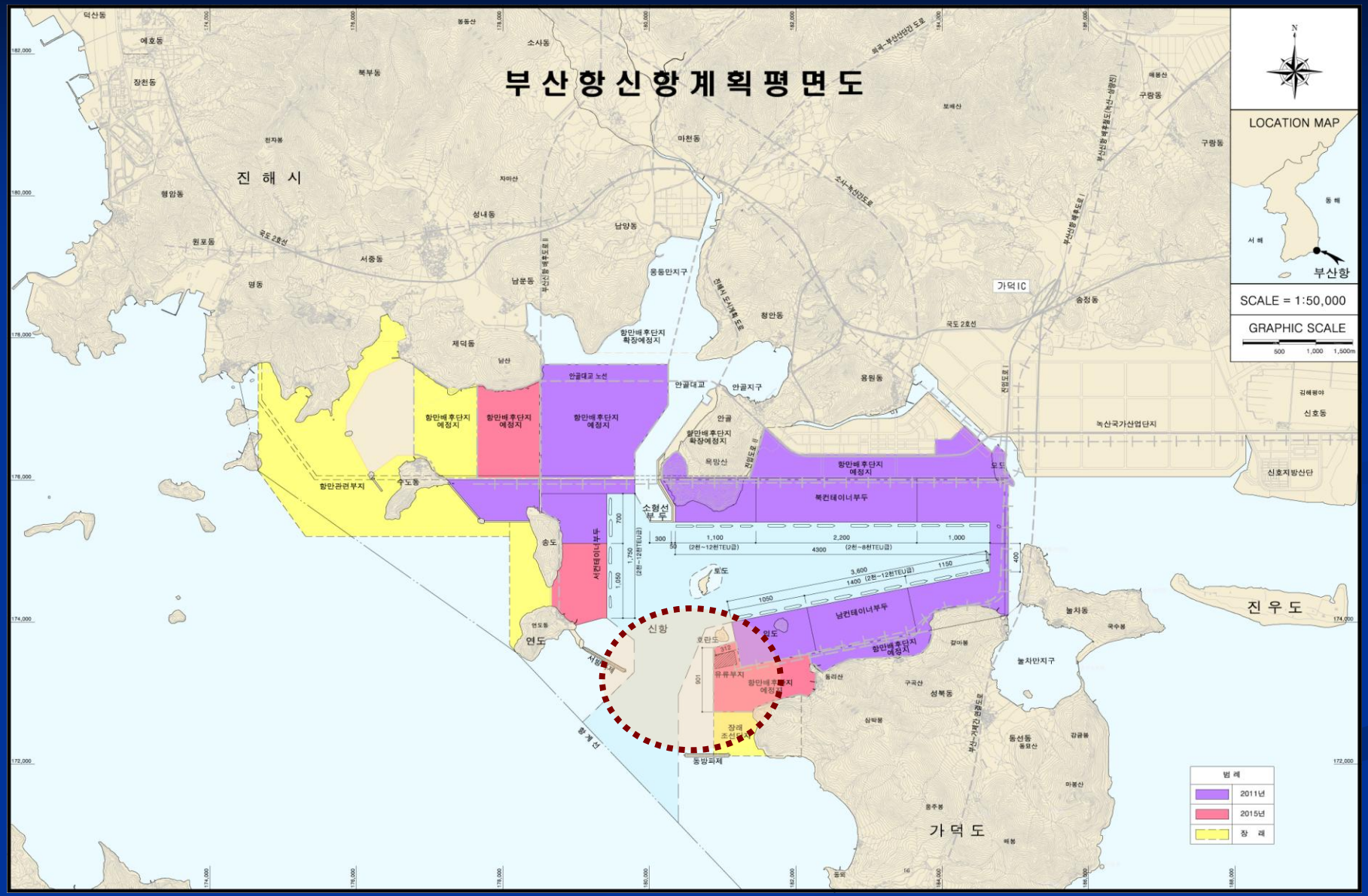
Yosu



Available Site in Yosu Terminal (Reserved site for Hub)

Ulsan New Port (Proposed site for Hub)

Busan New Port (Proposed site for Hub)



PART 6.

Spillover Effects of NEA Oil Hub

Cooperation among NEA Countries & Open Market Structure

☐ Stabilization of Supply & Demand in NEA

- In case Korea develops into NEA Oil Hub, NEA countries can respond any emergence with large volume of commercial oil like Singapore

☐ Contribution to acceleration of open market structure

- Entry into domestic market by foreign independent tankage firms, shipping companies, surveyors and trading companies accelerate competitive open market environment

☐ Coping with Asian Premium collectively

- NEA countries can reduce logistics cost and transportation time by using Korea logistics facilities and cooperate to cope with Asian premium collectively

Prospective of NEA Oil Hub

□ NEA Oil Hub enlarged into Asia and Pacific

- Enlargement of Oil Hub centered in Korea into India, Hawaii, North America and South America

* The World Oil Trade